

What is claimed is:

1    1. A frequency hopping communications device for  
2    transmitting signals on a plurality of M subcarrier  
3    signals in parallel, each of said M subcarrier signals  
4    corresponding to a different one of M subcarrier signal  
5    frequencies, said M subcarrier signal frequencies being  
6    a subset of N subcarrier frequencies on which said  
7    communications device may transmit signals over time,  
8    where M<N, said frequency hopping communications device  
9    including:

10        a frequency control circuit for controlling which  
11        of the N subcarrier frequencies are used by said device  
12        for the transmission of signals;

13        a plurality of M separate subcarrier signals paths  
14        operating in parallel, each of the M subcarrier signal  
15        paths including a programmable signal generator coupled  
16        to said frequency control circuit, a power  
17        amplification circuit and a filter circuit, said  
18        programmable signal generator for generating a  
19        subcarrier signal having a subcarrier frequency  
20        corresponding to said subcarrier signal path to which  
21        said signal generator corresponds; and

22        a combining circuit for combining analog  
23        subcarrier signals corresponding to different  
24        subcarrier signal paths prior to transmission.

1    2. The device of claim 1, wherein each of the M signal  
2    filter circuits, that each correspond to a different  
3    one of said M signal paths, is a fixed filter, at least  
4    one of the M fixed filters having a passband bandwidth  
5    at least equal to Y times the average frequency spacing

6    between the N frequencies that said device can use as  
7    the N subcarrier frequencies, where Y is a positive  
8    number greater than 1.

1    3.    The method of claim 2, wherein Y > N divided by M.

1    4.    The method of claim 2, wherein Y is at least as  
2    large as N.

1    5.    The method of claim 2, wherein each of said M  
2    signal filter circuits are identical fixed filters each  
3    having a passband bandwidth covering the full set of N  
4    subcarrier signal frequencies which may be used by said  
5    device.

1    6.    The method of claim 5, wherein the M subcarrier  
2    signals are OFDM subcarrier signals and where the N  
3    subcarrier frequencies are evenly spaced frequencies.

1    7.    The device of claim 2, wherein the fixed filter  
2    included on each of said M signal paths is positioned  
3    in series with said corresponding power amplification  
4    circuit either before or after the corresponding power  
5    amplification circuit.

1    8.    The device of claim 7,  
2            wherein the programmable signal generator included  
3    in each subcarrier signal path generates an analog  
4    subcarrier signal; and  
5            wherein said power amplification circuit and said  
6    filter circuit included in each subcarrier signal path  
7    are analog circuits.

1 9. The device of claim 1, wherein each of the M  
2 signal filter circuits, that each correspond to a  
3 different one of said M signal paths, is a programmable  
4 filter.

1 10. The device of claim 9, wherein each of the M  
2 programmable filters has a passband corresponding to  
3 the subcarrier signal frequency of the subcarrier  
4 signal generated by the programmable signal generator  
5 circuit included on the same subcarrier signal path as  
6 the programmable filter..

1 11. The device of claim 10, wherein the programmable  
2 filters have a passband which has a bandwidth  
3 sufficient to pass said subcarrier signal but reject  
4 the nearest neighboring one, in frequency, of said N  
5 subcarrier signals.

1 12. The device of claim 9, wherein said device further  
2 transmits information using at least one additional  
3 preselected subcarrier frequency, the device further  
4 comprising:

5 an additional subcarrier signal path including an  
6 amplifier and fixed filter for amplifying and filtering  
7 a subcarrier signal corresponding to said additional  
8 preselected subcarrier frequency.

1 13. The device of claim 12, where said additional  
2 subcarrier frequency corresponds to a control channel  
3 used to transmit control information.

1 14. A frequency hopping communication method for use  
2 in a communications system wherein a device can  
3 transmit information using M subcarrier signals at a  
4 time, each of the M subcarrier signals corresponding to  
5 a different subcarrier frequency, where M is less than  
6 N and where N is the total number of different  
7 subcarrier frequencies said device can use over time,  
8 the method comprising:

9                   i) operating M programmable signal generators  
10 to generate said M subcarrier signals;

11                   ii) separately processing each of the M  
12 subcarrier signals to produce M processed subcarrier  
13 signals, the processing of each of said M subcarrier  
14 signals including a amplification operation and a  
15 filtering operation, said separate processing thus  
16 including M separate filtering operations; and

17                   iii) combining the M processed subcarrier  
18 signals to generate a frequency division multiplexed  
19 transmission signal;

20                   iv) controlling at least one of said M  
21 programmable signal generators to change the frequency  
22 of the subcarrier signal generated by said at least one  
23 programmable signal generator; and

24                   v) repeating steps (i), (ii), and (iii).

1 15. The method of claim 14, wherein said M subcarrier  
2 signals are analog signals and wherein said filtering  
3 operation is an analog filtering operation.

1 16. The method of claim 14, wherein said M separate  
2 filtering operations are performed using M separate  
3 fixed filters, at least one of the M fixed filters

4 having a bandwidth at least equal to Y times the  
5 average frequency spacing between the N frequencies  
6 that said device can use as the N subcarrier  
7 frequencies, where Y is a positive number greater than  
8 1.

1 17. The method of claim 16, wherein  $Y \geq N$  divided by  
2 M.

1 18. The method of claim 16, wherein Y is equal to or  
2 greater than N.

1 19. The method of claim 15, wherein said M separate  
2 filtering operations are performed using identical  
3 fixed filters each having a bandwidth covering the full  
4 set of N subcarrier signal frequencies which may be  
5 used by said device.

1 20. The method of claim 19, wherein the N subcarrier  
2 signals are OFDM subcarrier signals.

1 21. The method of claim 14, wherein said M separate  
2 filtering operations are performed using M separate  
3 programmable filters, the frequency of each of each of  
4 the M programmable filters corresponding to the  
5 frequency of the subcarrier signal being filtered.

1 22. The method of claim 14, further comprising:  
2 changing the amount of power amplification  
3 performed on one of the M subcarrier signals when the  
4 frequency of said subcarrier signal is changed.

1    23. The method of claim 16, wherein controlling at  
2    least one of said M programmable signal generators to  
3    change the frequency of the subcarrier signal includes:  
4        operating said M programmable generators to switch  
5    from generating a first set of M subcarrier signals  
6    corresponding to a first set of M uniformly spaced  
7    subcarrier frequencies to generating a second set of M  
8    subcarrier signals corresponding to a second set of M  
9    uniformly spaced subcarrier frequencies, a first  
10   subcarrier frequency in said first set of M subcarrier  
11   frequencies being separated from a first subcarrier  
12   frequency in said second set of M subcarrier  
13   frequencies by a frequency spacing that is less than Y  
14   times the frequency spacing between subcarrier signals  
15   in said first and second sets of M subcarrier signals.